

OPTICAL MODULATOR**ABSTRACT OF THE DISCLOSURE**

A method and apparatus for optical return-to-zero (RZ) modulation based on a single
5 Mach-Zehnder modulator driven by non-return-to-zero (NRZ) electrical signals. The method
and apparatus allow for continuously electrically tunable duty cycles and lead to chirped-RZ
formats. A “push-pull” embodiment involves driving one control arm of the Mach-Zehnder
with a differentially encoded version of an NRZ data stream and driving the other control arm
with an inverted and time-delayed copy of the same differentially encoded data stream. A
10 “push-push” embodiment involves driving one control arm of the Mach-Zehnder with a
differentially encoded version of an NRZ data stream and driving the other control arm with a
time-delayed but non-inverted copy of the same differentially encoded data stream. In one or
more embodiments, the duty cycle of the RZ modulation is controlled via the selection of the
time delay between the electrical signals that drive the two arms of the Mach-Zehnder.